LIVERMORE LAB
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Sept. 30-Oct. 4, 2013.

CBS NEWS INCH BY INCH

The unified lasers at the National Ignition Facility deliver 1.8 megajoules of energy and 500 terawatts of power, which is 1,000 times more than the United States uses at any one moment.

Fusion energy may prove an elusive goal, but researchers at Lawrence Livermore's National Ignition Facility (NIF) are getting closer.

In a recent piece published in the journal *Physics of Plasmas*, John Edwards, associate director for inertial confinement fusion and high-energy-density science, said NIF scientists are getting closer to reactions that produce more energy than they need to get going, and added that the obstacles to realizing nuclear fusion involve engineering problems rather than basic physics.

Fusion energy harnesses the same power source that makes the sun shine. It involves pushing together atomic nuclei -- the protons and neutrons of atoms -- to form heavier elements and release energy.

To read more, go to *CBS*.

Slate AVOIDING A WORST-CASE SCENARIO

The sixth reactor building of the Fukushima Dai-ichi nuclear power plant in Japan on Feb. 28, 2012, nearly a year after it was destroyed by an earthquake and tsunami. Photo by Yoshikazu Tsuno/AFP/Getty Images

Hours after a massive earthquake and tsunami struck Japan on March 11, 2011, a team of Lawrence Livermore scientists mobilized to begin assessing the danger from the crippled Fukushima Dai-ichi nuclear plant. The 40 team members include physicists, meteorologists, computer modelers and health specialists and their specialty is major airborne hazards -- toxic matter from chemical fires, ash from erupting volcanoes, or radioactive emissions.

The scientists' work -- secret at the time and barely known to the public even today -- had an enormous impact on Japan's nuclear crisis, averting a potentially disastrous U.S. overreaction.

New information about the accident's severity presents a different perspective on events at Fukushima, which have generally been portrayed as a near-Armageddon.

To read more, go to *Slate*.

abc NEWS HOW DOES IT STAY AFLOAT

This image shows what appears to be a new island off the coast of Pakistan after the Sept. 24, 2013 earthquake struck the country

A new island that mysteriously appeared off the coast of Pakistan following a massive earthquake last week may disappear as quickly as it arose.

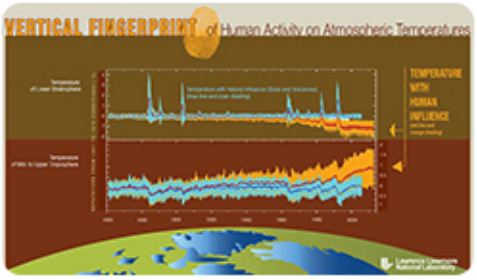
"No one knows why most of these islands appear," said Rob Mellors, a seismologist at Lawrence Livermore National Laboratory. "Usually pressure builds up and they appear one day. It's a bit of a mystery."

Mellors said it is common for mud volcanoes to bubble up bits of gas. "It would be safe to go on one of these islands. There is nothing exceptionally unique about this one, other than it was triggered by a faraway earthquake directly, which is rare," he said.

To read more, go to *ABC*.

ScienceDaily®

UP HIGH IN THE SKY



A graphic representation of the fingerprints, both manmade and natural, on the vertical structure of the atmosphere.

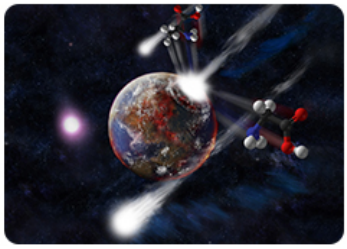
Human activity affects various levels of atmosphere, according to a new report by scientists from Lawrence Livermore and six other scientific institutions.

Manmade changes such as the increased production of greenhouse gases cause the stratosphere to cool while the mid- to upper troposphere heats up. A new study shows that natural influences alone would not cause these temperature changes.

"Human activity has very different effects on the temperature of the upper and lower atmosphere, and a very different fingerprint from purely natural influences," said Benjamin Santer, the lead researcher in the paper appearing in the *Proceedings of the U.S. National Academy of Sciences.* "Our results provide clear evidence for a discernible human influence on the thermal structure of the atmosphere."

To read more, go to *Science Daily*.

FT Magazine RETHINKING THE ORIGINS OF LIFE



A simulation shows a comet hitting the young Earth, generating the amino acids necessary for life. Photo courtesy of Matthew Genege/Imperial College London.

Scientists have demonstrated a new way in which the building blocks of life could have been created on Earth and elsewhere in the solar system.

They fired ultra-fast projectiles into an icy mixture simulating a comet. The shockwave caused chemical reactions that produced "prebiotic" life-building compounds including amino acids, which make up proteins.

The new study suggests that icy comets hitting a rocky planet -- or, conversely, rocky meteorites hitting an icy planet -- would have produced amino acids in the same way.

The experiment was designed to test a prediction by Nir Goldman of Lawrence Livermore National Laboratory (who also participated in the new study) that bombardment of Earth by icy comets around 4 billion years ago would have generated prebiotic chemicals through shock-induced reactions.

To read more, go to *FT Magazine*.

theENGINEER
First for technology & innovation www.theengineer.co.uk

HARVESTING THE SUN

Black metal could lead to more efficient solar panels.

The use of plasmonic black metals could lead to a pathway to more efficient photovoltaics (PV) -- the use of solar panels containing photovoltaic solar cells -- to improve solar energy harvesting, according to researchers.

A Lawrence Livermore Materials Engineering Division (MED) research team has made the breakthrough by experimenting with black metals. These nanostructured metals are designed to have low reflectivity and high absorption of visible and infrared light.

Black metals are not classic metals but can be thought of as an extension of the black silicon concept. When silicon is treated in a certain way, such as being roughened at the nanoscale level, it traps light by multiple reflections, increasing its solar absorption. This gives the silicon a black surface that's able to better trap the full sun's wavelength spectrum.

To read more, go to *The Engineer*.
